

1 **Supplementary material:**2 **Table S1.ICD-9 codes, diagnostics and number of specific diagnoses by BMI category**

ICD-9	diagnostics	n, (%)				<i>p</i> value
		BMI <25	BMI 25-30	BMI >30	TOTAL	
53110	Acute gastric ulcer with perforation, without mention of obstruction	3(0.75)	2(0.56)	2(0.49)	7(0.60)	NS
53111	Acute gastric ulcer with perforation, with obstruction	1(0.25)	0	0	1(0.08)	NS
53120	Acute gastric ulcer with hemorrhage and perforation, without mention of obstruction	1(0.25)	0	0	1(0.08)	NS
53150	Chronic or unspecified gastric ulcer with perforation, without mention of obstruction	3(0.75)	0	2(0.49)	5(0.42)	NS
53160	Chronic or unspecified gastric ulcer with hemorrhage and perforation, without mention of obstruction	0	1(0.28)	1(0.24)	2(0.17)	NS
53210	Acute duodenal ulcer with perforation, without mention of obstruction	2(0.5)	3(0.84)	3(0.73)	8(0.68)	NS
53220	Acute duodenal ulcer with hemorrhage and perforation, without mention of obstruction	0(0)	4(1.12)	2(0.49)	6(0.51)	NS
53250	Chronic or unspecified duodenal ulcer with perforation,	4(1)	2(0.56)	4(1.98)	10(0.85)	NS

	without mention of obstruction						
53251	Chronic unspecified duodenal ulcer with perforation, with obstruction	or	0	1(0.28)	0	1(0.08)	NS
53260	Chronic unspecified duodenal ulcer with hemorrhage and perforation, without mention of obstruction	or	1(0.25)	4(1.12)	0	5(0.42)	NS
53450	Chronic unspecified gastrojejunal ulcer with perforation, without mention of obstruction	or	0	1(0.28)	1(0.24)	2(0.17)	NS
53641	Infection of gastrostomy	of	7(1.75)	4(1.12)	6(1.47)	17(1.46)	NS
5400	Acute appendicitis with generalized peritonitis		7(1.75)	4(1.12)	3(0.73)	14(1.20)	NS
5401	Acute appendicitis with peritoneal abscess		4(1)	3(0.84)	5(1.23)	12(1.03)	NS
5511	Umbilical hernia with gangrene		0	1(0.28)	0	1(0.08)	NS
55120	Ventral hernia, unspecified, with gangrene		0	1(0.28)	0	1(0.08)	NS
55129	Other ventral hernia with gangrene		1(0.25)	0	0	1(0.08)	NS
5513	Diaphragmatic hernia with gangrene		1(0.25)	0	1(0.24)	2(0.17)	NS
5518	Hernia of other specified sites, with gangrene		1(0.25)	0	0	1(0.08)	NS
56081	Intestinal peritoneal	or	48a(12)	25a, b(7.00)	22b(5.42)	95(8.16)	NS

	adhesions with obstruction (postoperative) (postinfection)					
56722	Peritoneal abscess	23(5.75)	25(7.00)	20(4.92)	68(5.84)	NS
56729	Other suppurative peritonitis	18(4.5)	21(5.88)	19(4.67)	58(4.98)	NS
56738	Other retroperitoneal abscess	2(0.5)	1(0.28)	5(1.23)	8(0.68)	NS
56789	Other specified peritonitis	4(1)	5(1.40)	4(0.98)	13(1.11)	NS
5679	Unspecified peritonitis	10(2.5)	11(3.08)	8(1.97)	29(2.49)	NS
5680	Peritoneal adhesions (postoperative) (postinfection)	42(10.5)	44(12.3)	50(12.31)	136(11.6)	NS
56961	Infection of colostomy or enterostomy	2(0.5)	1(0.28)	4(0.98)	7(0.60)	NS
56981	Fistula of intestine, excluding rectum and anus	22(5.5)	12(3.36)	18(4.43)	52(4.47)	NS
56983	Perforation of intestine	47(11.75)	33(9.24)	45(11.0)	125(10.7)	NS
5754	Perforation of gallbladder	5(1.25)	2(0.56)	6(1.47)	13(1.11)	NS
5763	Perforation of bile duct	0	1(0.28)	1(0.24)	2(0.17)	NS
5764	Fistula of bile duct	4(1)	1(0.28)	0	5(0.42)	NS
5770	Acute pancreatitis	137a(34.25)	144a, b(40.3)	174b(42.86)	455(39.1)	0.037
53121	Acute gastric ulcer with hemorrhage and perforation, with obstruction	0	0	0	0	NS
53151	Chronic or unspecified gastric ulcer with perforation, with obstruction	0	0	0	0	NS
53161	Chronic or unspecified gastric	0	0	0	0	NS

	ulcer with hemorrhage and perforation, with obstruction						
53211	Acute duodenal ulcer with perforation, with obstruction	0	0	0	0	NS	
53221	Acute duodenal ulcer with hemorrhage and perforation, with obstruction	0	0	0	0	NS	
53261	Chronic or unspecified duodenal ulcer with hemorrhage and perforation, with obstruction	0	0	0	0	NS	
53310	Acute peptic ulcer of unspecified site with perforation, without mention of obstruction	0	0	0	0	NS	
53311	Acute peptic ulcer of unspecified site with perforation, with obstruction	0	0	0	0	NS	
53320	Acute peptic ulcer of unspecified site with hemorrhage and perforation, without mention of obstruction	0	0	0	0	NS	
53321	Acute peptic ulcer of unspecified site with hemorrhage and perforation, with obstruction	0	0	0	0	NS	
53350	Chronic or unspecified peptic ulcer of unspecified site with perforation,	0	0	0	0	NS	

	without mention of obstruction						
53351	Chronic or unspecified peptic ulcer of unspecified site with perforation, with obstruction	0	0	0	0	NS	
53360	Chronic or unspecified peptic ulcer of unspecified site with hemorrhage and perforation, without mention of obstruction	0	0	0	0	NS	
53361	Chronic or unspecified peptic ulcer of unspecified site with hemorrhage and perforation, with obstruction	0	0	0	0	NS	
53410	Acute gastrojejunal ulcer with perforation, without mention of obstruction	0	0	0	0	NS	
53411	Acute gastrojejunal ulcer with perforation, with obstruction	0	0	0	0	NS	
53420	Acute gastrojejunal ulcer with hemorrhage and perforation, without mention of obstruction	0	0	0	0	NS	
53421	Acute gastrojejunal ulcer with hemorrhage and perforation, with obstruction	0	0	0	0	NS	
53430	Acute gastrojejunal	0	0	0	0	NS	

	ulcer without mention of hemorrhage or perforation, without mention of obstruction						
53451	Chronic or 0	0	0	0	0	NS	
	unspecified gastrojejunal ulcer with perforation, with obstruction						
53460	Chronic or 0	0	0	0	0	NS	
	unspecified gastrojejunal ulcer with hemorrhage and perforation, without mention of obstruction						
53461	Chronic or 0	0	0	0	0	NS	
	unspecified gastrojejunal ulcer with hemorrhage and perforation, with obstruction						
53901	Infection due to 0	0	0	0	0	NS	
	gastric band procedure						
53981	Infection due to 0	0	0	0	0	NS	
	other bariatric procedure						
55121	Incisional ventral 0	0	0	0	0	NS	
	hernia, with gangrene						
5519	Hernia of 0	0	0	0	0	NS	
	unspecified site, with gangrene						
56739	Other 0	0	0	0	0	NS	
	retroperitoneal infections						
5755	Fistula of 0	0	0	0	0	NS	
	gallbladder						

3 Abbreviations: BMI: Body mass index; The letter a and b were used to indicate the
4 difference between groups and if there is statistical difference between the two
5 subgroups, different letters shall be used for identification.

6 **TableS2. Univariate analysis of baseline characteristics by BMI category after adjustment of**
 7 **confounding factors**

	BMI<25 kg/m ² (n=357)	BMI 25-30 kg/m ² (n=357)	BMI>30 kg/m ² (n=357)	<i>p</i> value
Age,n(%)				0.137
<45	51(14.29)	47(13.17)	43(12.04)	
45-64	116(32.49) ^a	120(33.61) ^{a,b}	150(42.02) ^b	
65-89	161(45.10)	171(47.90)	157(43.98)	
>90	29(8.12) ^a	19(5.32) ^a	7(1.96) ^b	
Female, n (%)	167(46.78)	141(39.50)	162(45.38)	0.115
Ethnicity, n (%)				0.199
White	264(73.95)	254(71.15)	268(75.07)	
Black	37(10.36)	36(10.08)	34(9.52)	
Hispanic or latino	10(2.80)	14(3.92)	8(2.24)	
Asian	6(1.68)	11(3.08)	1(0.28)	
Other	40(11.20)	42(11.76)	46(12.89)	
Marital status, n (%)				0.303
Married	167(46.78)	196(54.90)	183(51.26)	
Single/divorced/separated/unkn own	142(39.78)	121(33.89)	128(35.85)	
Widowed	48(11.20)	40(11.20)	46(12.89)	
Admission type, n (%)				0.036
Elective	33(9.24) ^a	50(14.01) ^{a,b}	55(15.41) ^b	
Emergency/urgent	324(90.76) ^a	307(85.99) ^{a,b}	302(84.59) ^b	
Insurance type, n (%)				0.550
Medicare/Medicaid	237(66.39)	236(66.11)	224(62.75)	
Private	108(30.25)	109(30.53)	125(35.01)	
Other	12(3.36)	12(3.36)	8(2.24)	
SOFA	5(3-8) ^a	5(3-7) ^{a,b}	5(3-9) ^b	0.014

SAPS II	40(30-50)	39(29-50)	39(29.5-50)	0.794
SIRS	3(3-4)	3(3-4)	3(3-4)	0.805
qSOFA	2(1-2)	2(1-2)	2(1-2)	0.122
OASIS	34(27-40)	33(28-41)	34(27-41)	0.943
Charlson comorbidity index	1(0-3)	2(0-3)	1(0-3)	0.817

8 Abbreviations: BMI: Body mass index; SOFA: sepsis-related organ failure assessment;
9 SAPSII: Simplified Acute Physiology Score II; SIRS: systemic inflammatory response
10 syndrome; OASIS: Oxford Acute Severity of Illness Score. The letter a and b were used
11 to indicate the difference between groups and if there is statistical difference between
12 the two subgroups, different letters shall be used for identification. Adjusted for age,
13 gender, admission type, insurance type, marital status, ethnicity.

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Table S3. Univariate analysis of clinical outcome by BMI category after adjustment of confounding factors

	BMI<25 kg/m ² (n=357)	BMI25–30kg/m ² (n=357)	BMI>30 kg/m ² (n=357)	<i>p</i>
Mortality,n(%)				
Hospital mortality	69(19.33)	65(18.21)	51(14.29)	0.174
30-day mortality	65(18.21)	47(13.17)	45(12.61)	0.066
90-day mortality	99(27.73)	83(23.25)	76(21.29)	0.119
Length of stay ,day(IQR)				
Hospital LOS	14.98(8.53-28.53)	15.39(7.85-27.03)	16.16(9.12-29.87)	0.16
Living patients(n=886)	15.07(8.85-27.82)	14.33(7.91-24.88)	16.58(9.63-29.93)	0.082
Dead patients(n=185)	14.16(5.28-29.69)	17.98(7.08-33.25)	13.39(5.95-29.82)	0.992
ICU LOS	3.13(1.83-7.81) ^a	3.60(1.90-8.91) ^a	4.97(2.21-13.45) ^b	<0.001
Living patients(n=957)	3.10(1.78-6.61) ^a	3.25(1.82-7.74) ^a	4.93(2.21-13.29) ^b	<0.001
Dead patients(n=185)	5.91(2.21-13.96)	11.71(3.74-31.11)	6.86(2.08-15.09)	0.096

Abbreviations: BMI: Body mass index; LOS: length of stay. The letter a and b were used to indicate the difference between groups and if there is statistical difference between the two subgroups, different letters shall be used for identification. Adjusted for age, gender, admission type, insurance type, marital status, ethnicity.

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Ventilation , n(%)	188(52.66)	203(56.86)	219(61.34)	0.064
Dialysis, n (%)	21(5.9)	30(8.4)	28(7.8)	0.4
Vasoactive agent, n(%)	123(34.45)	123(34.45)	129(36.13)	0.863

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Table S5. Univariate analysis of laboratory examination by BMI category				
	BMI<25kg/m ²	BMI25-30kg/m ²	BMI>30kg/m ²	p
HGB	9.50(8.30-10.70),n=354	9.60(8.4-10.80),n=355	9.70(8.6-11.2),n=356	0.053
WBC	10(6.1-14.53),n=354	9.7(6.5-13.8),n=355	10.7(6.83-14.58),n=356	0.145
PLT	184.5(114.5-269.5)n=354	182(124-252)n=355	187(123.5-269.5)n=357	0.732
CRE	1.1(0.8-1.8) ^a ,n=354	1.2(0.9-2.2) ^b ,n=355	1.4(0.9-2.3) ^b ,n=357	<0.001
BUN	25(16-39),n=354	25(16-41),n=355	26(16-44.5),n=357	0.57
ALB	2.6(2.2-3.1),n=208	2.7(2.2-3.2),n=215	2.7(2.3-3.1),n=201	0.597
Cl	108(105-113) ^{a,b} ,n=354	109(105-112) ^a ,n=356	108(104-112) ^b ,n=357	0.021
K	3.6(3.2-4.0),n=354	3.7(3.3-4.0),n=356	3.7(3.4-4.1),n=357	0.124
Na	135(132-139) ^a ,n=354	136(133-139) ^{a,b} ,n=356	137(134-139) ^b ,n=357	0.042
GLU	152(122.75-194) ^a ,n=354	154(125-195.75) ^a ,n=356	168(136.5-224) ^b ,n=357	0.001
LAC	2.6(1.6-4.6),n=279	2.7(1.5-4.425),n=286	2.4(1.4-4.2),n=287	0.329
BIL	1(0.5-2.85)	1.2(0.6-2.425)	1.1(0.6-2.5)	0.397

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Abbreviations: BMI: Body mass index; HGB: hemoglobin; WBC: white blood cell count; PLT: platelet count; ALB: albumin; CRE: creatinine; BUN: urea nitrogen; GLU: glucose; LAC: lactate; BIL: bilirubin; Na: sodium; Cl: chlorine; K: potassium. The letter a and b were used to indicate the difference between groups and if there is statistical difference between the two subgroups, different letters shall be used for identification. Adjusted for age, gender, admission type, insurance type, marital status, ethnicity.

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136	Table S6. The results of subgroup analysis of multi-factor regression analysis		
	Exposure	Acute pancreatitis HR, <i>p</i> Value	Other diagnostics HR, <i>p</i> Value
	Non-adjusted		
	BMI	0.98 (0.96, 1.00), 0.0612	0.98 (0.96, 0.99), 0.0009
	BMI		
	<25 kg/m ²	1.0(Reference)	1.0(Reference)
	25-30 kg/m ²	0.66 (0.46, 0.93), 0.0188	0.89 (0.70, 1.13), 0.3328
	>30 kg/m ²	0.67 (0.49, 0.94), 0.0184	0.72 (0.57, 0.92), 0.0086
	Adjust		
	BMI	0.98 (0.95, 1.00), 0.0821	0.97 (0.95, 0.99), 0.0047
	BMI		
	<25 kg/m ²	1.0(Reference)	1.0(Reference)
	25-30 kg/m ²	0.65 (0.42, 1.01), 0.0534	0.81 (0.57, 1.15), 0.2391
	>30 kg/m ²	0.70 (0.46, 1.08), 0.1065	0.61 (0.42, 0.89), 0.0103
137	Adjusted for gender; admission age; SOFA; admission type; insurance; marital status;		
138	ethnicity; HGB; GLU; ALB; Charlson comorbidity index.		
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Table S7. The results of multi-factor regression analysis after multiple imputation

Exposure	MI.ITER= 0 HR, <i>p</i> value	MI.ITER= 1 HR, <i>p</i> value	MI.ITER= 2 HR, <i>p</i> value	MI.ITER= 3 HR, <i>p</i> value	MI.ITER= 4 HR, <i>p</i> value	MI.ITER= 5 HR, <i>p</i> value
Non-adjusted						
BMI	0.98 (0.97, 0.99) <0.0001	0.98 (0.97, 0.99) <0.0001	0.98 (0.97, 0.99) <0.0001	0.98 (0.97, 0.99) <0.0001	0.98 (0.97, 0.99) <0.0001	0.98 (0.97, 0.99) <0.0001
BMI						
<25 kg/m ²	1.0(Reference)	1.0(Reference)	1.0(Reference)	1.0(Reference)	1.0(Reference)	1.0(Reference)
25-30 kg/m ²	0.78 (0.64, 0.96) 0.0158	0.75 (0.64, 0.88) 0.0005	0.85 (0.73, 1.01) 0.0589	0.81 (0.69, 0.95) 0.0110	0.82 (0.69, 0.96) 0.0159	0.79 (0.67, 0.93) 0.0049
>30 kg/m ²	0.68 (0.56, 0.83) 0.0001	0.68 (0.58, 0.80) <0.0001	0.68 (0.58, 0.80) <0.0001	0.66 (0.56, 0.78) <0.0001	0.71 (0.61, 0.84) <0.0001	0.68 (0.57, 0.80) <0.0001
Adjusted						
BMI	0.98 (0.96, 0.99) <0.0001	0.98 (0.97, 0.99) <0.0001	0.98 (0.97, 0.99) <0.0001	0.98 (0.97, 0.99) <0.0001	0.98 (0.97, 0.99) <0.0001	0.98 (0.97, 0.99) <0.0001
BMI						
<25 kg/m ²	1.0(Reference)	1.0(Reference)	1.0(Reference)	1.0(Reference)	1.0(Reference)	1.0(Reference)
25-30 kg/m ²	0.74 (0.61, 0.91) 0.0042	0.74 (0.63, 0.88) 0.0004	0.82 (0.69, 0.97) 0.0192	0.79 (0.67, 0.94) 0.0069	0.80 (0.68, 0.95) 0.0088	0.77 (0.65, 0.91) 0.0019
>30 kg/m ²	0.65 (0.53, 0.79) <0.0001	0.65 (0.55, 0.77) <0.0001	0.65 (0.55, 0.77) <0.0001	0.63 (0.53, 0.74) <0.0001	0.68 (0.58, 0.81) <0.0001	0.66 (0.56, 0.79) <0.0001

Adjusted for gender; admission age; SOFA; admission type; insurance; marital status;
ethnicity; HGB; GLU; ALB; Charlson comorbidity index.

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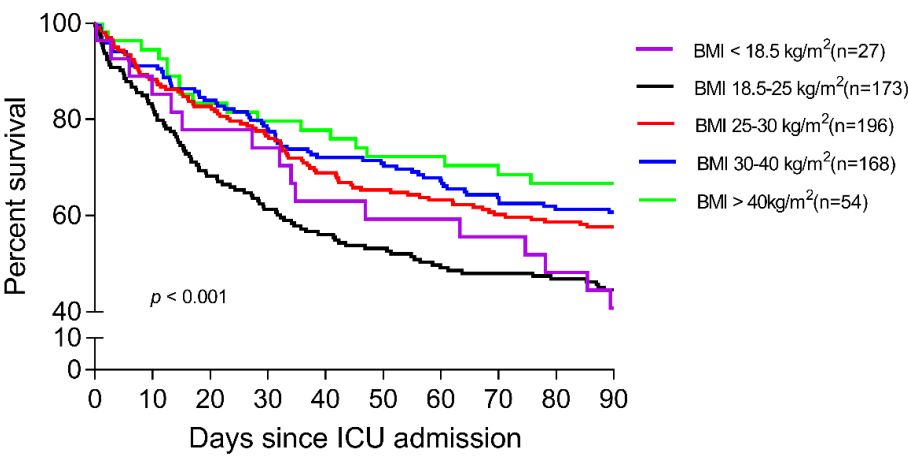
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191	Table S8. Subgroup analysis of multi-factor regression analysis after multiple imputation					
Exposure	MI.ITER=0 HR, p value	MI.ITER= 1 HR, p value	MI.ITER= 2 HR, p value	MI.ITER= 3 HR, p value	MI.ITER= 4 HR, p value	MI.ITER= 5 HR, p value
Acute pancreatitis						
Non-adjusted						
BMI	0.98 (0.96, 1.00) 0.0612	0.98 (0.97, 1.00) 0.0348	0.98 (0.96, 1.00) 0.0288	0.98 (0.97, 1.00) 0.0491	0.99 (0.97, 1.00) 0.0863	0.99 (0.97, 1.01) 0.1758
Adjust						
BMI	0.99 (0.97, 1.01) 0.3791	0.99 (0.97, 1.01) 0.1755	0.99 (0.97, 1.01) 0.1986	0.99 (0.97, 1.01) 0.2298	0.99 (0.97, 1.01) 0.2988	1.00 (0.98, 1.02) 0.8201
Other patients						
Non-adjusted						
BMI	0.98 (0.96, 0.99) 0.0009	0.97 (0.96, 0.99) <0.0001	0.98 (0.96, 0.99) <0.0001	0.97 (0.96, 0.98) <0.0001	0.98 (0.96, 0.99) <0.0001	0.97 (0.96, 0.99) <0.0001
Adjust						
BMI	0.97 (0.96, 0.98) <0.0001	0.97 (0.96, 0.98) <0.0001	0.97 (0.96, 0.98) <0.0001	0.97 (0.96, 0.98) <0.0001	0.97 (0.96, 0.98) <0.0001	0.97 (0.96, 0.98) <0.0001

192 Adjusted for gender; admission age; SOFA; admission type; insurance; marital status;
193 ethnicity; HGB; GLU; ALB; Charlson comorbidity index.

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211 **Figure S1. Kaplan–Meier curve for 90-days survival stratified by BMI.**

212 Abbreviations: BMI: Body mass index; Fig.S1 represents 90-days Kaplan–Meier

213 curves, P<0.001 by log-rank test.

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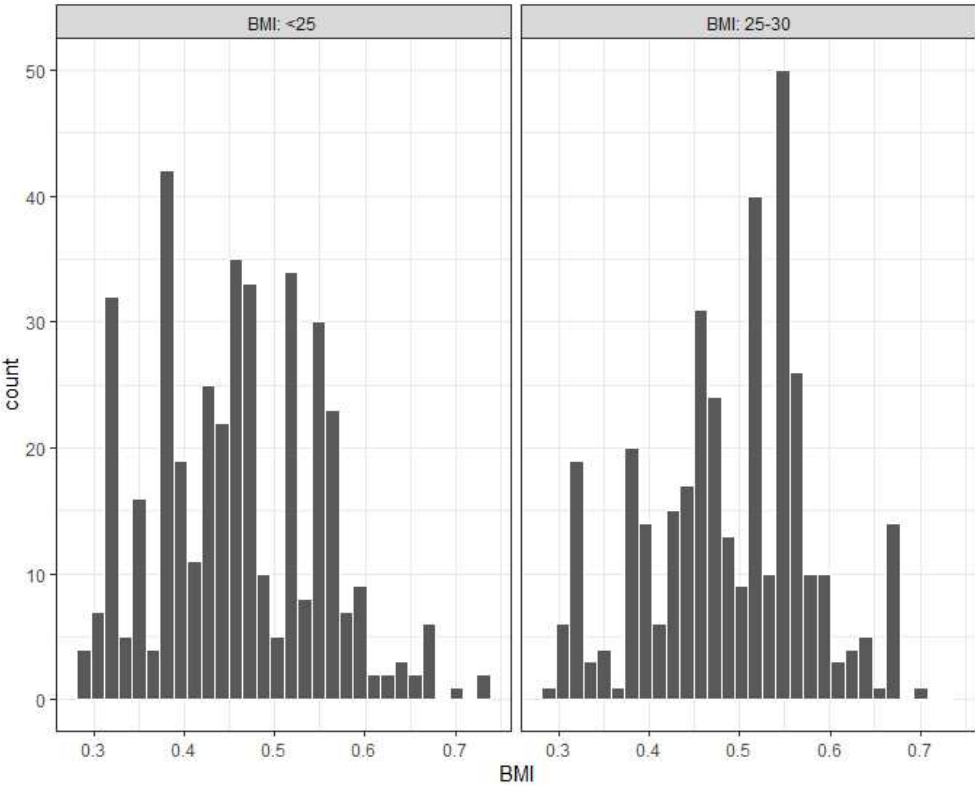
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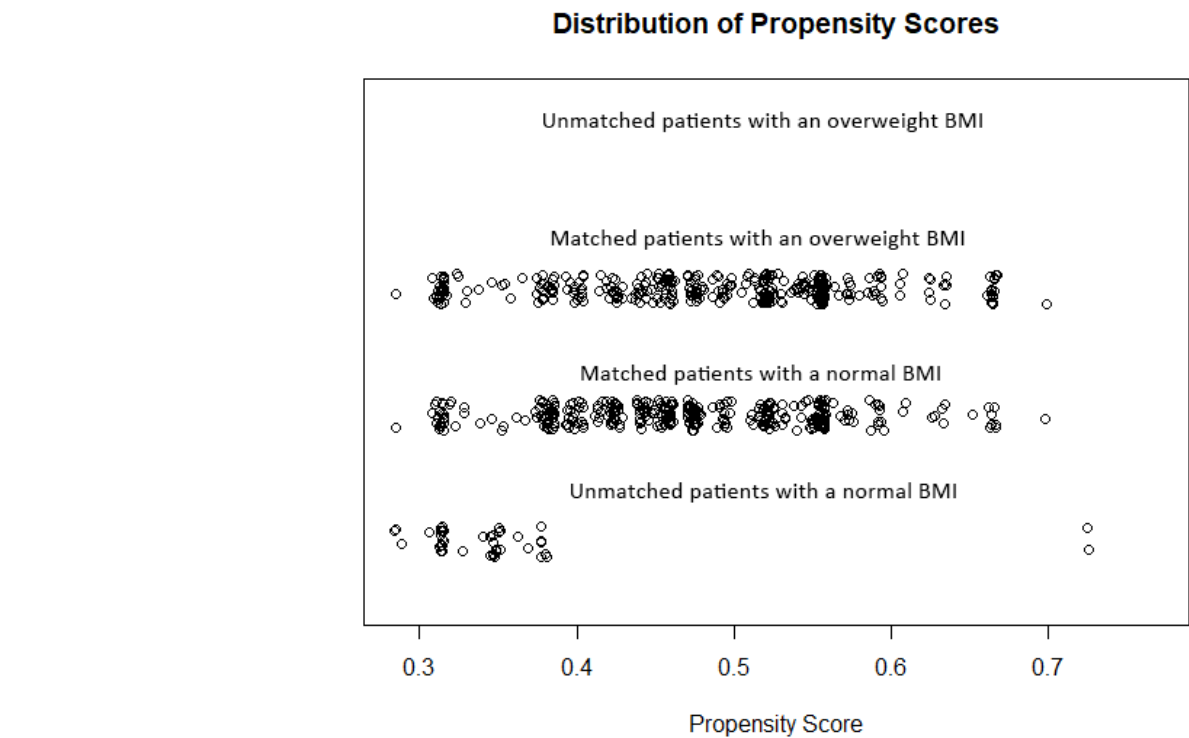
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232 **Figure S2. Propensity score counting of normal and overweight patients.**
233 Abbreviations: BMI: Body mass index;
234 Adjusted for age, gender, admission type, insurance type, marital status, ethnicity.
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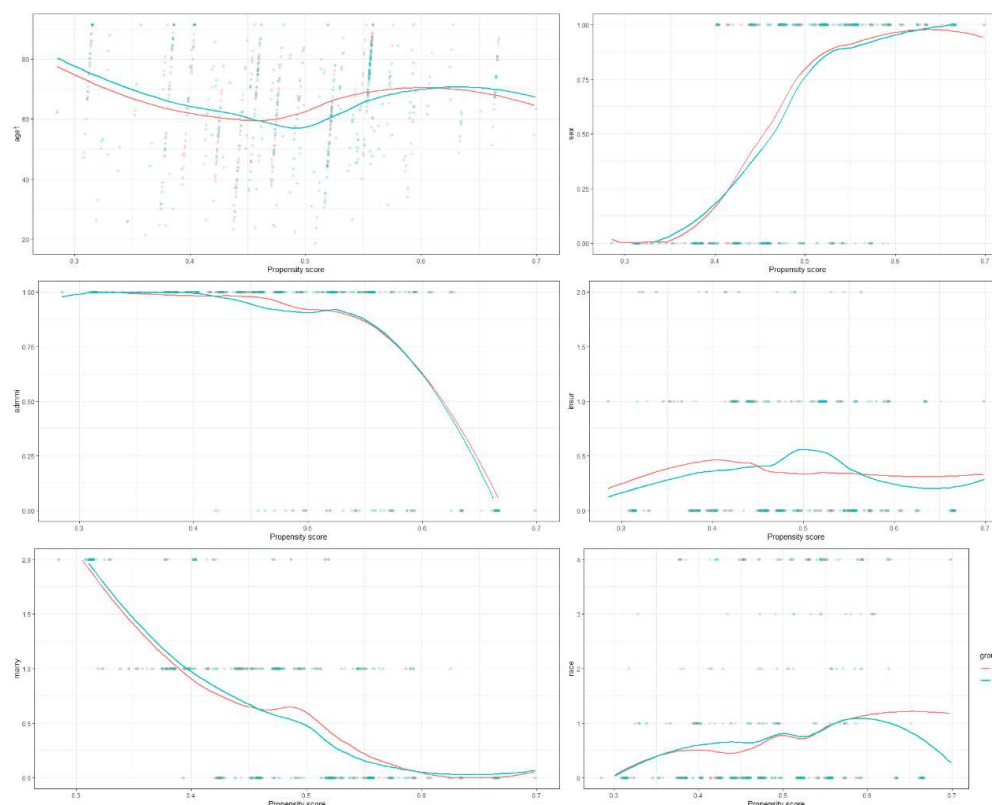
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237 **Figure S3. Distribution of propensity scores between normal and overweight**

238 **patients.** Abbreviations: BMI: Body mass index;

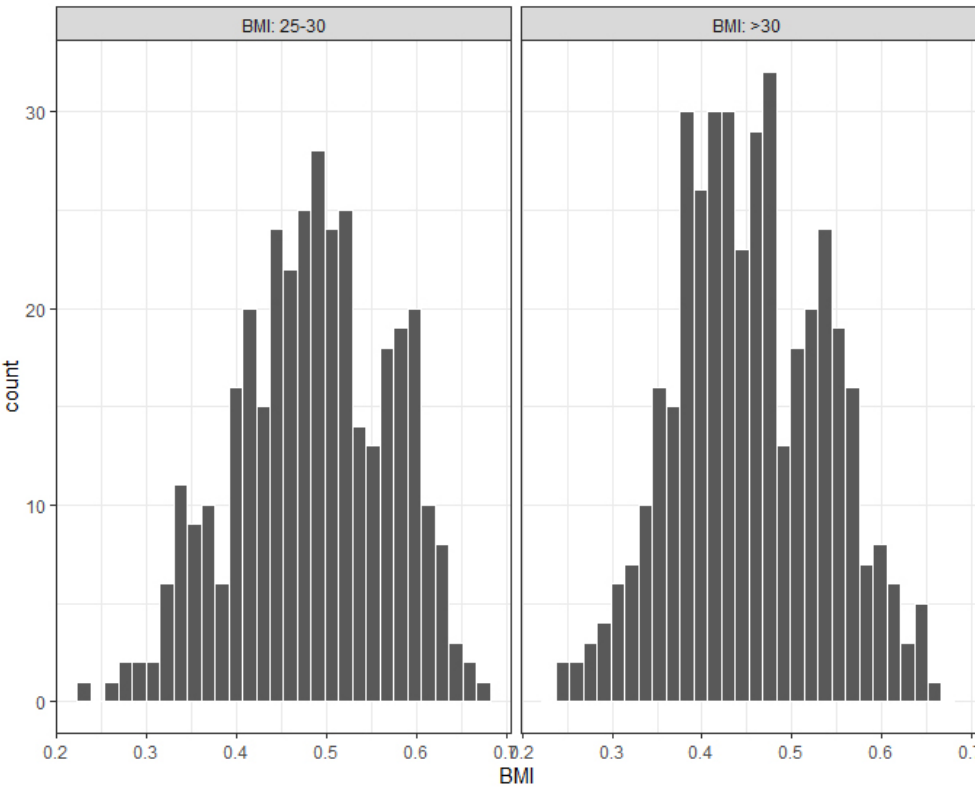
239 Adjusted for age, gender, admission type, insurance type, marital status, ethnicity.

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242 **Figure S4. Trend of baseline characteristics after adjustment for confounding**
 243 **factors.** Abbreviations: BMI: Body mass index; age1: Admission age of patients; sex:
 244 gender of patients; admmt: Admission type of patients; insur: Insurance type of patients;
 245 marry: Marital status of patients; race: Ethnicity of patients; group 0: patients with an
 246 overweight BMI; group 1: patients with a normal BMI;
 247 Adjusted for age , gender ,admission type ,insurance type ,marital status , ethnicity.



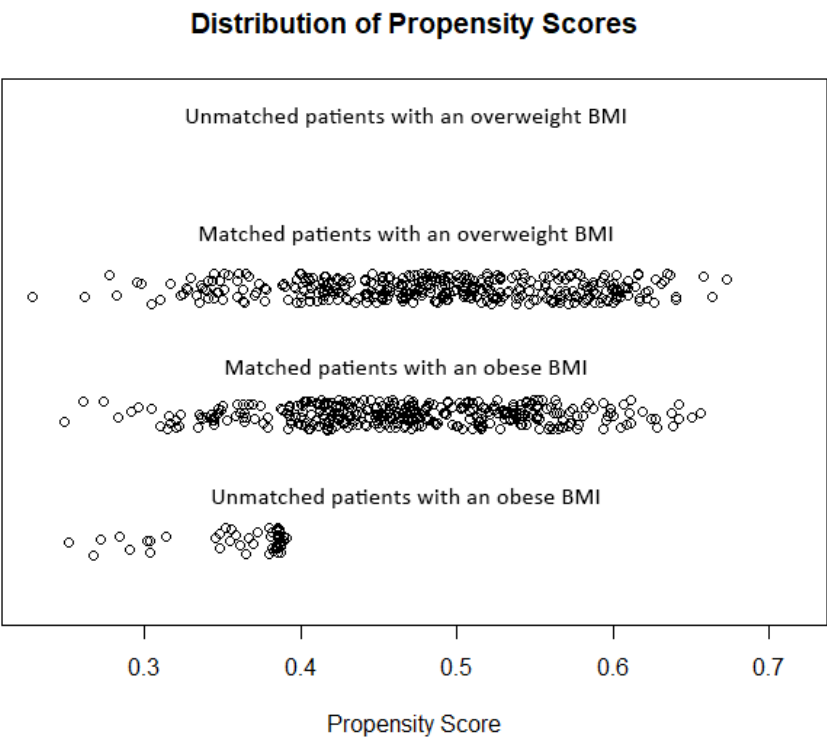
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249 **Figure S5. Propensity score counting of obese and overweight patients.**

250 Abbreviations: BMI: Body mass index;

251 Adjusted for age , gender ,admission type ,insurance type ,marital status , ethnicity.

252



253

254 **Figure S6. Distribution of propensity scores between obese and overweight**

255 **patients.** Abbreviations: BMI: Body mass index;

256 Adjusted for age , gender ,admission type, insurance type ,marital status , ethnicity.

257

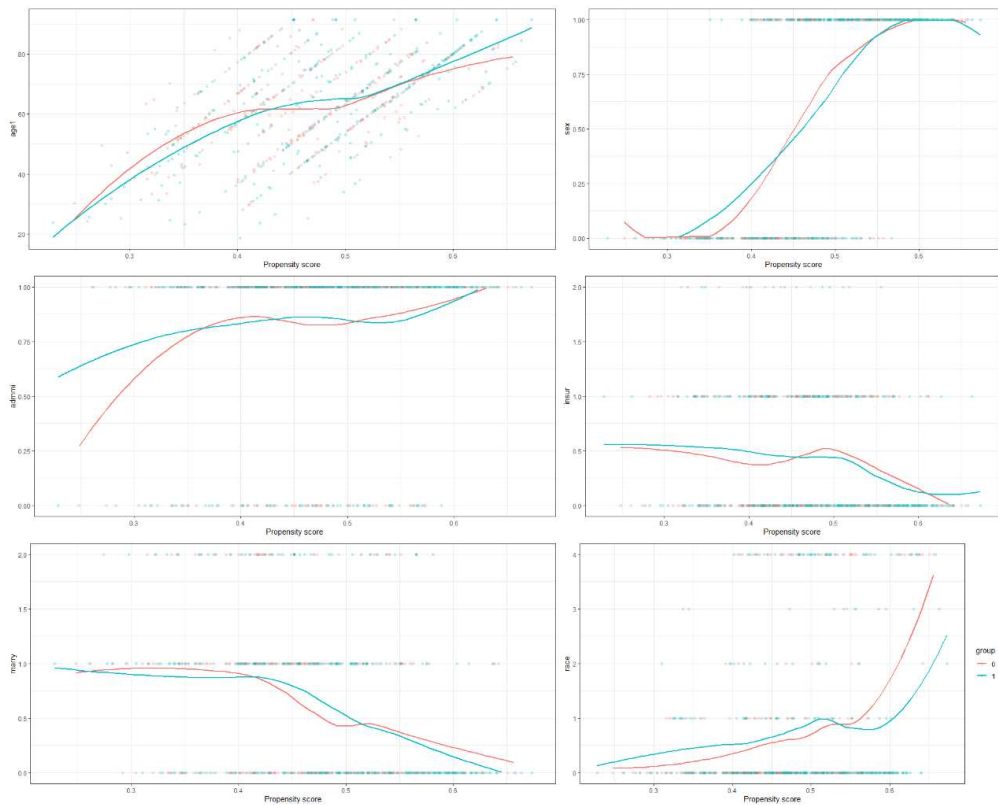
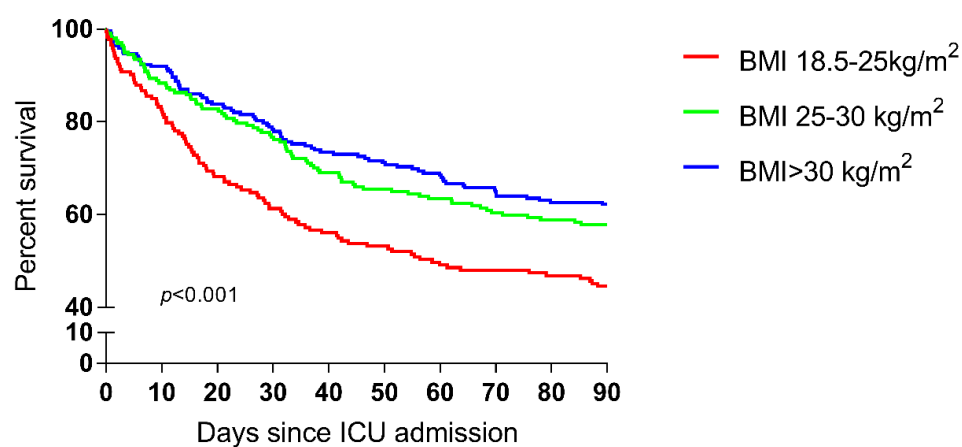


Figure S7. Trend of baseline characteristics after adjustment for confounding factors. Abbreviations: BMI: Body mass index; age1: Admission age of patients; sex: gender of patients; admmt: Admission type of patients; insur: Insurance type of patients; marry: Marital status of patients; race: Ethnicity of patients; group 0: patients with an overweight BMI; group 1: patients with a obese BMI; Adjusted for age, gender, admission type, insurance type, marital status, ethnicity.



277

278 **Figure S8. Kaplan–Meier curve for 90-days survival stratified by BMI.**

279 Abbreviations: BMI: Body mass index; Fig.S8 represents 90-days Kaplan–Meier

280 curves, $P<0.001$ by log-rank test.